ITU Director Radiocommunication Bureau's interview with Brazilian Satellite Communications Association (ABRASAT) – June 2025

1. **Abrasat - What are the main current challenges related to global spectrum management?**

Mario Maniewicz - Global spectrum management faces several challenges.

One issue is the increase in demand for spectrum, driven by the growth of new mobile and satellite services and applications. This demand increases the competition for spectrum and orbital resources and the complexity in spectrum sharing.

Differences in national interests and development levels also complicate international regulations.

Another challenge in spectrum management is the need for regulatory frameworks to keep pace with technological evolution. While updates are needed to reflect new technologies, regulations must also provide stability for operators and administrations.

The current deployment of large constellations of non-geostationary satellites introduces new regulatory and coordination challenges due to their size and complexity. One difficulty is to ensure power limits are effective in preventing interference with geostationary satellites.

The increased number of satellites and space missions also raises concerns about the sustainability of space operations, which rely on spectrum management and coordination.

The interference and compatibility issues are also growing, particularly in services such as Radio Navigation Satellite Services (RNSS). These cases point to the need for the enforcement of existing regulations to protect systems used for the safety of life.

Finally, Administrations and operators must comply with international regulations and respect the rights of other administrations. This includes preventing unauthorized transmissions, particularly from non-GSO systems that may interfere with authorized services.

As you can see, global spectrum management faces several challenges that require coordinated international efforts. ITU-R strives to provide international regulations and standards that overcome these challenges and ensure the efficient and equitable use of spectrum and orbital resources.

2. **Abrasat - In your opinion, what should be the priorities for the upcoming WRC-27?**

Mario Maniewicz - The agenda of the World Radiocommunication Conference 2027 (WRC-27) reflects a strong focus on satellite and science services, which account for more than 80% of the items under discussion. This distribution indicates the current priorities of the ITU-R membership.

Examples of these agenda items include:

New frequency bands for IMT (WRC-27 – Agenda item 1.7)

The identification of additional frequency bands for the terrestrial component of IMT. Sharing and compatibility studies and development of technical conditions for the use of IMT, while ensuring the protection of services to which the frequency band is allocated.

MSS – IoT development (WRC-27 – Agenda item 1.12)

Possible allocations to the mobile satellite service to develop the Internet of Things (IoT). Studies required for the future development of low-data-rate non-geostationary mobile-satellite systems.

Direct connectivity space stations and IMT (WRC-27 – Agenda item 1.13)

Regulatory actions, including possible new allocations to the MSS for direct communication between space stations and IMT user equipment to complement terrestrial IMT network coverage. Studies on frequency ranges currently used by terrestrial IMT systems.

Future MSS – Additional allocations (WRC-27 – Agenda item 1.14)

Possible new frequency allocations and associated regulatory conditions for the mobile satellite service to support the implementation of applications, especially in remote and underserved areas.

3. Abrasat - How is the Bureau preparing for the impact of emerging technologies such as 6G and AI on spectrum needs?

Mario Maniewicz - ITU develops and updates international standards and regulations that support the introduction of new technologies, including 6G and Artificial Intelligence (AI).

As with previous generations of International Mobile Telecommunications (IMT), a clear standardization timeline has been defined for 6G, referred to as IMT-2030 (see "Timeline for IMT-2030"). This timeline outlines the progression from setting requirements and evaluation criteria to receiving technical proposals and approving specifications.

The initial phase of IMT-2030 has been completed with the approval of the Recommendation "Framework and overall objectives of the future development of IMT for 2030 and beyond", which established the foundation for further work.

Currently, ITU is developing the technical performance requirements and common evaluation criteria for candidate radio interface technologies (RIT) for the terrestrial component of IMT-2030.

In parallel, ITU has invited the submission of candidate RIT proposals within the period from February 2027 to February 2029 and has informed relevant External Organizations, including Standardization bodies and Industry fora.

Additional details about the evaluation process and associated independent evaluation groups (IEG) are available on the "Web page for the IMT-2030 submission and evaluation process".

With regard to spectrum for 6G services, frequency bands identified for IMT in past World Radiocommunication Conferences can be used by 3G, 4G, 5G, and future IMT-2030 systems. In addition, as mentioned previously, Agenda Item 1.7 of WRC-27 will consider the identification of new frequency bands for the terrestrial component of IMT.

In the area of Artificial Intelligence, ITU-R is conducting activities across multiple areas:

ITU-R Study Group 1 has published a report on Next generation spectrum monitoring, focusing on the application of data science methods, including AI and big data, for automation in spectrum monitoring.

ITU-R Study Group 3 organized a Workshop on the "Applications of machine learning in radio-wave propagation prediction", and its use in developing models of parameters or phenomena relevant in the prediction of radio-wave propagation.

ITU-R Study Group 6 is working on AI for broadcasting, including the use of generative AI in broadcasting programme, making workflows, and the extraction of audio and video objects during production.

4. Abrasat - What is your vision regarding the role of non-terrestrial networks and LEO constellations in the future of global connectivity?

Mario Maniewicz - Terrestrial and Non-Terrestrial Networks (NTNs) both play an important role in achieving global connectivity. NTN, including low Earth orbit (LEO) satellite constellations, are not intended to replace terrestrial systems, but to complement them.

NTNs can extend the coverage of terrestrial IMT systems to remote and underserved areas where ground-based infrastructure is limited or unavailable. Their ability to provide wide-area and low-latency communications makes them suitable for enhancing network resilience, providing global internet coverage, and supporting services such as real-time monitoring and navigation.

ITU-R is finalizing the detailed specifications for the satellite component of IMT-2020 and conducting studies on the future development of satellite-based IMT-2030. In addition, decisions of WRC-27 can support direct connectivity between space stations and IMT user equipment using the same frequency bands currently allocated to terrestrial IMT systems.

As demand for universal connectivity increases, NTNs and LEO constellations are

expected to become key components in a hybrid and integrated infrastructure that supports the next generation of mobile networks and communication services, serving both consumers and industries.

5. **Abrasat - How is the ITU adapting to the increase in satellite filings and mega-constellations? How has the ITU-R worked to ensure successful coordination between GSO and NGSO systems, considering the growth of non-geostationary constellations?**

Mario Maniewicz - The number of satellite filings submitted to the ITU has increased significantly, driven by the expansion of small satellites and non-geostationary orbit (non-GSO) constellations. In response, ITU-R has updated its regulatory framework and operational procedures to protect the shared use of spectrum-orbit resources.

A key objective of ITU-R is to manage the frequency spectrum and ensure radiocommunication services, including space services, can operate free of harmful interference. The Radio Regulations (RR) contain provisions to support this objective through various regulatory and technical mechanisms.

Allocation: Frequency bands are allocated to specific services across the three ITU Regions. Footnotes in the Table of Frequency Allocations may provide additional constraints.

Power Limits: Limits such as PFD, EIRP, and EPFD are applied to different bands and services to protect other systems and enable sharing.

Coordination: Coordination among administrations and operators helps ensure interference-free operations and facilitates cross-border communication.

Recording: Frequency assignments that meet ITU criteria are recorded in the Master International Frequency Register (MIFR) with favourable findings receive international recognition and protection. This also supports tracking of spectrum usage.

Monitoring: International monitoring systems are used to oversee spectrum usage, detect interference issues, and verify compliance with regulatory provisions.

The Radiocommunications Bureau carries out technical examinations for each satellite network submitted and publishes the results of the findings in the Bureau's biweekly International Frequency Information Circular (BRIFIC). This process takes into account technical conditions such as single entry and aggregate EPFD limits to protect GSO systems from non-GSO networks.

When interference occurs despite coordination and notification procedures, the Radio Regulations provide mechanisms for reporting and resolution, as outlined in Article 15, and Appendix 10. The Radiocommunications Bureau supports administrations in resolving these cases, which might also be brought before the Radio Regulations Board, if needed.

In addition, ITU-R conducts sharing and compatibility studies and updates recommendations and reports to address interference risks.

At the 2023 World Radiocommunication Conference (WRC-23), ITU-R addressed the need to protect geostationary fixed-satellite service (FSS) and broadcasting-satellite service (BSS) networks from the maximum aggregate EPFD produced by multiple non-GSO FSS systems operating in bands where EPDF limits are in place.

The revised Resolution 76 acknowledges that while individual non-GSO systems may comply with EPFD limits, the combined emissions of multiple systems could exceed acceptable thresholds and affect the performance of GSO networks. To address this, WRC-23 introduced a more structured approach to monitoring and coordination.

ITU strives to ensure that both traditional GSO and new non-GSO satellite systems can operate effectively without harmful interference.

6. **Abrasat - How is the ITU-R working to promote digital inclusion and improve access to telecommunications in remote and underserved areas?**

Mario Maniewicz - ITU-R's work in revising the Radio Regulations, harmonizing spectrum use, and developing global standards for satellite and mobile technologies supports economies

of scale, reduces the cost of services and devices, and helps expand broadband connectivity. These contribute to advancing digital inclusion worldwide.

Today, most of the global population is covered by mobile broadband networks. However, rural and remote areas that remain unconnected often depend of the deployment of satellite networks. As mentioned previously, WRC-27 agenda item 1.13 will consider direct connectivity between space stations and IMT user equipment, which could help extend the coverage of terrestrial networks even further.

To support Member States, particularly developing countries, the Radiocommunication Bureau (BR) provides technical assistance, as well as seminars and workshops aimed at disseminating knowledge on radiocommunication technologies and regulatory practices to a broader audience.

The Bureau also offers a range of software applications and digital tools, such as the ITU Space Explorer, RR Navigation tool, RR5 TFA Software, and platforms for electronic submission and communication. In addition, it maintains databases, online resources, and publications, handbooks, and guidelines. These resources help strengthen national capacity for effective radio-frequency spectrum management.

7. Abrasat - Could you comment on the ITU's efforts to ensure the sustainability of space use, given the increasing number of objects in orbit and the growing concern about space debris?

Mario Maniewicz - The ITU Plenipotentiary Conference of 2022 adopted Resolution 219, which called for urgent studies on the increasing use of radio-frequency spectrum and orbital resources in non-GSO orbit, focusing on its long-term sustainability. Complementing this, Resolution 218 reinforced ITU's commitment to improve global access to space and ensure all countries benefit socio-economically from space science and technology, in support of the United Nations "Space2030" Agenda.

The Radiocommunication Assembly (RA) in 2023 adopted Resolution ITU-R 74, promoting sustainable use of limited space resources and calling for the development of a new Recommendation on safe and efficient deorbiting and end-of-life disposal strategies for non-GSO space stations. ITU is also developing a Handbook on Best Practices for Sustainable Use of Frequencies and Associated Non-GSO Orbits.

ITU launched the Space Sustainability Gateway, which compiles strategies for post mission deorbiting or disposal of spacecrafts, guidelines, codes of conduct and best practices submitted by administrations and operators.

ITU launched the Space Connect webinar series, offering monthly virtual discussions on emerging trends and critical topics in the rapidly evolving space sector, including space safety, spectrum management, climate monitoring, emergency response, economic development, and other topics related to non-geostationary constellations.

ITU organized the first Space Sustainability Forum in September 2024, with over 1,000 participants from 90 countries, including participants from the United Nations and other Specialized Agencies. This forum has now become an annual platform to raise awareness, promote sustainable behaviour in space activities, and strengthen cooperation with other UN organizations on space sustainability. The next Forum is scheduled for 7–8 October 2025 in Geneva.

ITU also works closely with UNOOSA, COPUOS, and other UN organizations on current and future space-related activities, while also collaborating with IARU and other international organizations on relevant issues for the space sector.